

## Spaceward Bound Journal March 27, 2007



Teachers Mike Marchiondo, Jim Kuhl, Lynda Hoover and Dan Ruby teamed with balloon pilot Jim Thompson and crew to perform today's fieldwork. This team went to expedition Pisgah Crater and lava fields located at 34 degrees 44.81 minutes north latitude, 116 degrees 22.33 minutes west longitude. Arriving at 10:45AM PDT we found the sky sunny with few cumulus clouds, temperature in the low 50's Fahrenheit, with steady winds over 15 mph gusting over 30 mph.

The Pisgah Crater geology shows signs of several lava flows, much of which resulted in the formation of over three hundred 'lava tubes' in the region. Lava tubes form as flowing lava cools and hardens around the exterior of the flow. Gradually, the flow becomes encapsulated in the newly formed igneous rock shell as the molten interior magma continues to flow by the influence of gravity. As the volcanic eruption subsides the flowing lava vacates the solidified igneous shell leaving a hollow lava cavern known as a lava tube. The absence of lava in the tubes combined with other geophysical conditions causes the collapse of ceiling areas of the tubes creating access openings called 'skylights'.



Lava tubes and caves are of great interest to scientists studying geology and biology. The tubes have been identified as areas of extremeophile habitation such as SLIME – subsurface life in mineral environments - as scientist Penny Boston has been investigating. Locating this life is dependent on locating the lava tubes. A new method of fingerprinting skylights accessing lava tubes is by thermography – using thermal infrared imagery to identify temperature gradients indicative to lava cave or tube openings due to the cooler air that is being 'exhaled' from the subsurface. This type of data is gathered using special thermal infrared cameras to 'photograph' the temperature gradient. The research is being conducted by scientist J. Judson Wynne and balloon pilot Jim Thompson. The data is first gathered on the ground at the skylight openings by the expedition team and later confirmed by aerial thermal imagery from a hot air balloon. Unfortunately, due to the excessive winds today the aerial data collection could not be performed.

The complimenting research of the lava tube locations by thermography and existing microbial life in the mineral environments will be used as analogs for thermographic remote sensing of similar geologic/geomorphologic features on Mars or elsewhere in the continued search for extraterrestrial life.